

ON THE INDIAN SPECIES OF *TRICHOMALOPSIS* CRAWFORD
(HYMENOPTERA : CHALCIDOIDEA : PTEROMALIDAE)

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(With thirty-seven text-figures)

Key words: Chalcidoidea, Pteromalidae, *Trichomalopsis* new species

The Indian species of *Trichomalopsis* Crawford are reviewed. These include *T. apanteloctena* (Crawford) and *T. deplanata* Kamijo & Grissell and six new species *T. acarinata* sp. nov., *T. nigra* sp. nov., *T. ovigastria* sp. nov., *T. thekkadiensis* sp. nov., *T. neelagastria* sp. nov., and *T. travancorensis* sp. nov. A key to the Indian species of *Trichomalopsis* is also provided.

INTRODUCTION

Trichomalopsis Crawford, a species-rich genus of Pteromalidae, is best known from Europe and North America. As currently understood, the genus is composed of nearly three dozen species, largely Holarctic and Oriental (Kamijo and Grissell 1982). Graham (1969) provided the most recent key to European and North American species. Kamijo and Grissell (1982) worked on the Oriental species associated with rice fields. Boucek (1988) synonymised *Metadicylus* Girault under *Trichomalopsis*.

During our studies on the Indian Pteromalidae, a large number of specimens belonging to *Trichomalopsis* were collected mainly from Kerala. The studies revealed 8 species, which include *T. apanteloctena* (Crawford) and *T. deplanata* Kamijo & Grissell, already known from the region, and 6 new species. Besides describing the new species, a key to the Indian species of *Trichomalopsis* is also provided.

The terminology generally follows that of Graham (1969). In addition, the antennal funicle segments are numbered F1 through F6 and gastral tergites T1 to T6, beginning with the first

after the petiole and the last before epipygium. The following abbreviations are also used: OOL - Ocellar ocular distance; POL - Posterior ocellar distance; SMV - Submarginal vein; MV - Marginal vein; PMV - Postmarginal vein; and STV - Stigmal vein.

The type specimens are kept in the collections of the Western Ghats Field Research Station, Zoological Survey of India, Calicut.

Trichomalopsis Crawford

Trichomalopsis Crawford, 1913, *Proc. U.S. natn. Mus.*, 45: 251 (type species: *Trichomalopsis shirakii* Crawford).

Eupteromalus Kurdjumov, 1913, *Russk. Ent. Obozr.*, 13:12 (type species *Pteromalus nidulans* Thomson)

Nemicromelus Girault, 1917, *Descr. Hym. Chalcid. Var. Observ.*, V: 4 (type species: *Merisus subapterus* Riley)

Metadicylus Girault, 1926. *Insecutor, Inscit menstr.*, 14: 71 (type species *Metadicylus australiensis* Girault)

KEY TO THE INDIAN SPECIES OF GENUS

Trichomalopsis CRAWFORD

1. Lower margin of clypeus incised medially (Fig. 3); head in dorsal view thick, 1.85 to 1.95x as broad as long (Fig. 2); occipital carina strongly curved medially (Fig. 1)
..... *apanteloctena* (Crawford)

¹Accepted October, 1998

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- Lower margin of clypeus only weakly emarginate (Figs 4, 20); head not very thick in dorsal view; if thick (1.9 to 2x as broad as long) then lower margin of face as in Fig. 4; occipital carina not strongly curved medially as above 2
2. Lower margin of face on either side of clypeus curved and projected below level of lower margin of clypeus (Fig. 4); head 1.9 to 2x as broad as long; flagellum in female stout (Fig. 5) *deplanata* Kamijo & Grissell
- Lower margin of face not projecting below level of lower margin of clypeus; head 2 to 2.1x as broad as long; flagellum not stout 3
3. Gastral petiole almost as long as nucha, weakly sculptured (Figs 13, 16); propodeum with post spiracular sulcus without transverse ridge; legs with coxae not concolorous with thorax, yellowish-brown or brownish-yellow 4
- Gastral petiole strongly transverse and unsculptured; post spiracular sulcus with a distinct transverse ridge; legs with coxae mostly concolorous with thorax 5
4. Pronotal collar weakly and irregularly margined or immargined; scape 0.9x eye length; pedicel plus flagellum almost as long as head width; T1 of gaster reaching only a little more than one third length (Fig. 18); temple length 0.5x eye length; head and thorax greenish-black with metallic reflection; antennae paler
..... *acarinata* sp. nov.
- Pronotal collar weakly but sharply margined except at sides; scape as long as eye; pedicel plus flagellum 0.84x head width; T1 reaching almost half length of gaster (Fig. 14); temple narrow, length 0.4x eye length; head and thorax black with little reflection; antennae darker *nigra* sp. nov.
5. Gaster oval; ovipositor sheaths strongly protruding (Fig. 24); head in dorsal view with temples rounded (Fig. 19); median area of propodeum broad (Fig. 23); 1.3x as broad as long; plicae not very sharp
..... *ovigastra* sp. nov.
- Gaster more elongated (Figs 9, 30, 37), ovipositor sheaths not strongly protruding as above; head in dorsal view different (Figs 6, 26, 32) with temples not much rounded; median area of propodeum less broad, 1.1 to 1.2x as broad as long; plicae more sharp 6
6. Propodeum with plicae very sharp, reaching tip of nucha; nucha more constricted; median carina strong (Fig. 8); T1 of gaster reaching only one third of length (Fig. 9); head in dorsal view with temples shorter (Fig. 6), length 0.5x eye length; pronotal collar irregularly margined ..
..... *thekkadiensis* sp. nov.
- Propodeum with plicae not sharp as above, at least slightly incomplete towards the end of nucha (Figs 29, 35); median carina not very strong; temples longer, 0.7x as long as eye (Figs 26, 32); T1 occupying little beyond or before half length of gaster (Figs 30, 37); pronotal collar weakly but more regularly margined ... 7
7. Gaster (Fig. 30) 1.8x as long as broad and longer than thorax; T1 occupying little less than half length, with only slight metallic blue gloss dorsally; nucha less convex in profile (Fig. 27); scape little shorter than eye (0.9x)
..... *travancorensis* sp. nov.
- Gaster (Fig. 37) 1.6x as long as broad, and as long as thorax; T1 occupying little beyond middle with bright metallic blue gloss dorsally; nucha more convex in profile (Fig. 33); scape as long as the eye *neelagastra* sp. nov.

DESCRIPTION OF SPECIES

Trichomalopsis apanteloctena (Crawford)
(Figs 1-3)

Trichomalopsis apanteloctena Crawford, 1911. *Proc. U.S. natn. Mus.*, 39: 618.

Eupteromalus parnarae Gahan, 1919. *Proc. U.S. natn. Mus.*, 56: 522.

The species can be identified by the following characters: Lower margin of clypeus rather deeply incised medially (Fig. 3); striation

on clypeus extending to lower margin of eyes and to malar sulcus; both mandibles with four teeth; head thick in dorsal view, 1.85 to 1.95x as broad as long (Fig. 2); occipital carina sharp, in posterodorsal view strongly curved medially (Fig. 1). Antennae with combined length of pedicel and flagellum in female 0.8 to 0.93x and in males 0.95 to 1.05x width of head. Pronotal collar indistinctly margined. Forewing with MV 1.55 to 2.1 x STV. Gaster 1.7 to 2x as long as broad.

Material examined: 8 Females, Kerala: Sreekariyam (Trivandrum), 25.ii.1989; 7 Females, Shertallai, 27.ii.1989; 1 Male, Kappil (Trivandrum), 26.ii.1989; 9 Females, 1 Male, Tenjipalam (Malappuram), ?.xi.1988; 2 Females, Attingal, 23.ii.1989; 2 Females, Ernakulam, 9.ii.1989; 6 Females, Kovalam, 24.ii.1989; 1 Female, Ochira (Quilon), 26.ii.1989; 3 Females, Valayar, 27.ii.1989; 3 Females, Tenjipalam, 24.xi.1988; 1 Female, Pamba, 21.xi.1997; 1 Female, Kadakattupara (Malappuram), 9.xi.1988; 1 Female, Chavara, 22.ii.1989; 2 Females, Silent Valley, 9.xii.1997; 5 Females, Elamathkavalai (Shertallai), 27.ii.1989; 1 Female, Kazhakuttom, 25.ii.1989; 1 Female, Varkala, 26.ii.1989, Coll. P.M. Sureshan.

Distribution: India (Kerala, Tamil Nadu, Karnataka,), Bangladesh, Korea, Malaysia, China, Japan, Taiwan, Philippines and Formosa.

Biology: Reared from *Cnaphalocrocis medinalis* (Guenee) (Lepidoptera: Pyralidae), *Pelopidas mathias* (Fabricius) (Lepidoptera: Hesperiidae) in India.

Trichomalopsis deplanata Kamijo & Grissell
(Figs 4 & 5)

Trichomalopsis deplanata Kamijo & Grissell, 1982: *Kontyu* 50: 84.

The diagnostic characters of the species are: Length 1.5-2.4 mm. Head in front view transverse, 1.3x as broad as high; lower margins of face on either side of clypeus curved and

projecting below lower margin of clypeus (Fig. 4); clypeus with lower margin weakly emarginate; both mandibles with four teeth; striae of clypeus extending almost to lower margin of eyes and to malar sulcus. Antennal toruli situated distinctly above level of lower edge of eyes; scape much shorter than eye length, almost reaching lower edge of median ocellus; flagellum stout (Fig. 5); combined length of pedicel and flagellum about 0.8x width of head. Pronotal collar not margined anteriorly. Propodeum with median carina not very strong; plicae sharp throughout; spiracular sulcus with a transverse ridge at middle. Forewing with MV 1.45 to 1.85x STV and little longer than PMV. Gaster ovate, about as long as thorax; 1.3 to 1.4x as long as broad; T1 occupying one-third length of gaster or more.

Material examined: 5 Females, 1 Male, Kerala: Ranni, 24.xi.1988; 2 Females, Tenjipalam (Malappuram), ix.1988; 1 Female, Thekkady, 14.ix.1986; 1 Female, 1 Male, Vayalar, 27.ii.1989, Coll. P.M. Sureshan.

Distribution: India (West Bengal, Kerala), Japan, Korea, China.

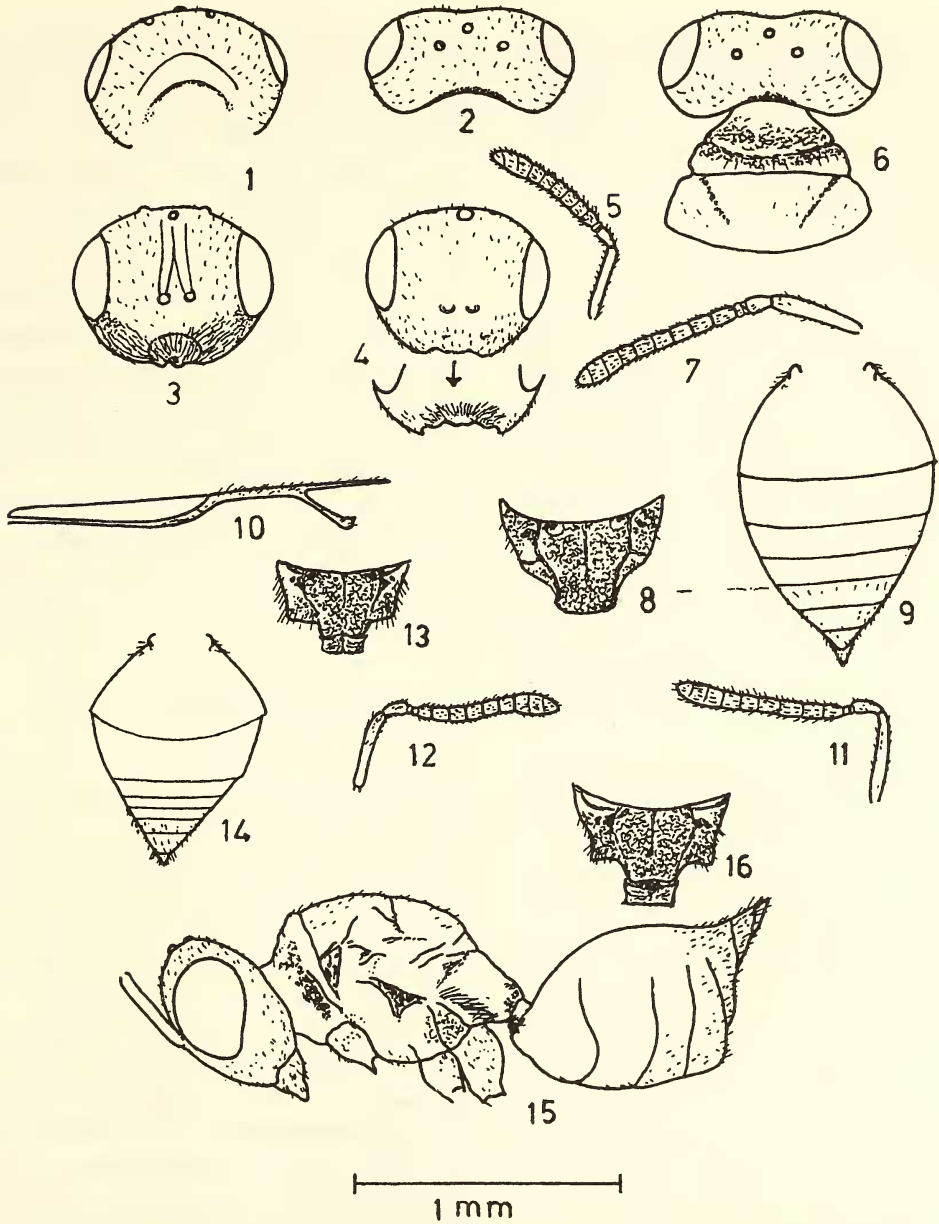
Biology: Reared in India from Tachinid puparium on paddy.

Trichomalopsis thekkadiensis sp. nov.
(Figs 6-11)

Female: Length 1.6-2.7 mm. (Holotype 2.4 mm). Bluish-green with metallic gloss; bronze-like gloss on thorax. Antennae with scape and pedicel testaceous, flagellum pale brown. Coxae concolorous with thorax, remainder of legs testaceous with tips of tarsi brown. Tegulae testaceous; wings hyaline; veins pale yellow.

Head (Fig. 6): Width 1.2x thorax; in dorsal view width 2x length and in front view width 1.3x height; POL 1.3x OOL; temple length 0.5x eye length; strongly converging behind eyes; eyes separated by 1.4x their height; malar space length

NEW DESCRIPTIONS



Figs 1-3: *Trichomalopsis apanteloctena* (Crawford) Female: 1. Head in posterodorsal view, 2. Head in dorsal view, 3. Head in front view;

Figs 4-5: *Trichomalopsis deplanata* Kamijo & Grissell Female: 4. Head in front view, 5. Antenna;

Figs 6-11: *Trichomalopsis thekkadiensis* sp. nov. Female: 6. Head and part of thorax in dorsal view, 7. Antenna, 8. Propodeum, 9. Gaster in dorsal view, 10. Forewing venation, 11. Male antenna;

Figs 12-14: *Trichomalopsis nigra* sp. nov. Female: 12. Antenna, 13. Propodeum and petiole, 14. Gaster in dorsal view;

Figs 15-16: *Trichomalopsis acarinata* sp. nov. Female: 15. Body in profile, 16. Propodeum and petiole

0.7x eye length; clypeus weakly emarginate anteriorly, striated, striae extending near lower margin of eyes; head otherwise moderately reticulate, finer on lower part. Antennae (Fig. 7) inserted above lower margin of eyes; scape almost as long as eye, almost reaching just above median ocellus; pedicel twice as long as wide; combined length of pedicel and flagellum 0.9x head width; club as long as 2.5 preceding segments combined.

Thorax: (Fig. 6) raised reticulate, length 1.7x width; pronotal collar irregularly margined. Mesoscutum width 2.4x length. Scutellum 1.2x as wide as long, similarly sculptured as on mesoscutum. Propodeum (Fig. 8) relatively long, about as long as scutellum medially; median area raised reticulate, sides finely reticulate; plicae strong, complete; median carina distinct; nucha highly constricted; callus sparsely hairy. Forewing (Fig. 10) with basal part bare; MV about 1.5x STV and very little longer than PMV. Relative lengths of SMV, MV, PMV and STV as 37: 13: 12.5: 8.5.

Gaster (Fig. 9): Length 1.6x width; slightly longer than thorax; T1 occupying about one third length of gaster.

Male: Length 1.7-2 mm. Similar to female but differs in having short gaster and antenna with longer pubescence.

Material examined: Holotype: Female, India, Kerala, Thekkady, 12.v.1986, Coll. T.C. Narendran & party. Allotype: Male, Kerala, Tenjipalam (Malappuram), 24.xi.1988, Coll. P.M. Sureshan. Paratypes: Kerala: 5 Females, Kayamkulam, 21.ii.1989; 5 Females, Varkala, 26.ii.1989; 3 Females, Vayalar, 27.ii.1989; 9 Females Kappil (Trivandrum), 26.ii.1989; 2 Females, Neendakara, 22.ii.1989; 4 Females, Ranni, 24.xi.1988; 3 Females, 1 Male, Tenjipalam (Malappuram), 24.xi.1988; 3 Females, Ernakulam, 9.ii.1989; 1 Female, Kovalam, 24.ii.1989; 1 Female, Edakkara, (Malappuram), 24.iv.89; 1 Female, Sreekariyam, 25.ii.1989; 1 Female, Madappally (Calicut), 30.x.1988; 2 Females,

Attingal, 23.ii.1989; 1 Female, Parambilpeedika (Malappuram), 10.xi.1988; 1 Female, Elamathkavala (Shertallai), 27.ii.1989; 2 Females, Kazhakuttom, 25.ii.1989, Coll. P.M. Sureshan.

Remarks: This species closely resembles *T. shirakii* Crawford, but differs from it as follows: 1. temple length 0.5x eye length (in *shirakii* temple length one quarter or slightly more of eye length) 2. scutellum longer than mesoscutum, 1.2x as wide as long (scutellum as long as mesoscutum and slightly transverse in *shirakii*) 3. propodeum without a deep fovea behind spiracle; nucha half as long as propodeum and not well defined in front (propodeum with a deep fovea behind spiracle, nucha little shorter than half length of propodeum and well defined in front in *shirakii*) 4. propodeum with bronze-like gloss like other areas of thorax (propodeum without such gloss in *shirakii*).

Trichomalopsis nigra sp. nov.

(Figs 12-14)

Female: Length 1.5-2 mm (Holotype 2 mm). Blackish to bluish-black with slight metallic reflection; scape pale brown on basal two third, tip of scape and remainder of antenna dark brown. Legs testaceous except base of hind coxae blackish; tarsi darker at tip. Tegulae pale brown; wings hyaline; veins pale yellow.

Head: Width 1.2x thorax; in dorsal view width 2.1x length and in front view width 1.4x height; temple length 0.4x eye length; POL 1.3x OOL; eyes separated by 1.54x their height; malar space 0.7x eye length; clypeus anteriorly weakly emarginate, striate; head otherwise moderately reticulate; Toruli separated by half their diameter, placed only slightly above lower edge of eyes; scape (Fig. 12) as long as eye, reaching level of vertex; combined length of pedicel and flagellum 0.84x head width; second anellus a little longer than first, club a little shorter than 3 preceding segments combined.

Thorax: Length 1.4x width; pronotal collar sharply margined, except at sides, with broad smooth strip posteriorly. Mesoscutum width 2.4x length, moderately reticulate. Scutellum convex, longer than mesoscutum; frenal furrow vague. Metanotum with area between hind margin of scutellum and dorsellum narrow with several longitudinal carinae. Propodeum (Fig. 13) with median area reticulate as on scutellum; median carina weak; plicae not sharp; nucha convex; spiracular sulcus shallow, without transverse ridge; callus moderately hairy. Forewing with basal cell and vein bare. Relative lengths of SMV, MV, PMV and STV as 26: 11: 10.5: 7.

Gaster: Petiole (Fig. 13) as long as nucha, weakly sculptured; gaster shorter than thorax (Fig. 14), length 1.4x width; T1 occupying almost half length.

Male: Unknown.

Material examined: Holotype: Female: India, Kerala, Shertallai (Kanhikuzhy), 27.ii.1989, Coll. P.M. Sureshan. Paratypes: Kerala: 2 Females, Sreekariyam, 25.ii.1989; 1 Female, Kayamkulam, 21.ii.1989; 1 Female, Ochira, 26.ii.1989; 1 Female, Chungathara (Malappuram), 24.iv.1989; 2 Females, Attingal, 23.ii.1989; 1 Female, Elamathkavalai (Shertallai), 27.ii.1989; 1 Female, Kovalam, 24.ii.1989, Coll. P.M. Sureshan.

Remarks: This species closely resembles *T. oryzae* Kamijo & Grissell but differs from it in having antennal toruli placed only slightly above lower margin of eyes; scape as long as eye; F1 narrower than pedicel; second anellus not much longer than first; malar space 0.7x eye length; eyes separated by 1.5x their height; mesoscutum width 2.4x length; gaster with T1 occupying almost half length (in *oryzae* toruli distinctly above lower edge of eyes; scape 0.83 to 0.92x eye length; F1 slightly wider than pedicel; second anellus much longer than first; malar space only 0.45x eye length; eyes separated

by 1.25x their height; mesoscutum twice as broad as long and T1 occupying more than one third length of gaster in *oryzae*).

Trichomalopsis acarinata sp. nov.
(Figs 15-18)

Female: Length 1.3-2.0 mm (Holotype 1.6 mm). Head and thorax dark green; thoracic dorsum with slight bronze-like gloss; gaster dark brown. Scape yellowish-brown, darker at tip; remainder of antenna dark brown. Legs yellowish-brown with coxae darker. Tegulae pale brown; wings hyaline; veins pale yellowish-brown.

Head (Fig. 15): Width 1.3x thorax; in dorsal view width 2.1x length and width 1.3x height in front view; POL 1.3x OOL; temple length half of eye length; malar space 0.6x eye length; eyes separated by 1.3x their height; clypeus striated, anterior margin weakly emarginate; toruli placed only a little above lower margin of eyes; scape (Fig. 17) 0.9x eye length, reaching level of vertex; pedicel plus flagellum almost equal to head width; club a little shorter than 3 preceding segments combined.

Thorax (Fig. 15): Length 1.5x width; pronotal collar weakly margined or immargined. Mesoscutum width 2.3x length. Scutellum less convex, similarly sculptured as on mesoscutum; frenal groove vague. Metanotum with area between hind margin of scutellum and dorsellum very narrow with longitudinal carinae. Propodeum (Fig. 16) with median area similarly sculptured as on scutellum; median carina weak; plicae not sharp; spiracles oval; postspiracular sulcus without transverse ridge; callus moderately hairy. Forewing with relative lengths of SMV, MV, PMV and STV as 14.5: 6: 5: 4.5.

Gaster: Petiole (Fig. 16) almost as long as nucha, sculptured; gaster (Fig. 18) ovate, length 1.5x width; T1 occupying little more than one third length.

Male: unknown.

Material examined: Holotype: Female: India, Kerala, Calicut University Campus, 2.v.1986, Coll. T.C. Narendran & party; Paratypes: Kerala: 5 Females, Kayamkulam, 21.ii.89; 3 Females, Neendakara, 22.ii.1989; 1 Female, Attingal, 24.ii.1989; 1 Female, Chavara, 22.ii.1989; 1 Female, Vazhani, 7.ii.1989, Coll. P.M. Sureshan.

Remarks: This species closely resembles *T. nigra* (also described) but differs from it by the combination of characters given in the key. It also resembles *T. oryzae* Kamijo & Grissell in the nature of gastral petiole, propodeum etc., but differs in having pronotal collar not margined; temple length half of eye length; toruli placed only slightly above lower edge of eyes; club more than twice as long as wide; second anellus little longer than first, and mesoscutum width 2.3x length (in *oryzae* pronotal collar weakly but clearly margined, except at sides; temple length one quarter of eye length; club twice as long as wide; toruli placed distinctly above lower edge of eyes; second anellus much longer than first and mesoscutum twice as broad as long).

Trichomalopsis ovigastra sp. nov.
(Figs 19-25)

Female: Length 1.8-2.4 mm (Holotype 2.1 mm). Body dark brownish-green with metallic gloss. Antennae brown with scape paler in basal two thirds. Coxae concolorous with thorax, fore and mid coxae partly brownish; remainder of legs yellowish-brown. Tegulae brown; wings hyaline; veins pale brown.

Head (Figs 19, 20): Width 1.2x thorax; in dorsal view width 2x length and in front view width 1.3x height; temple length 0.5x eye length, rounded posteriorly; POL 1.4x OOL; eyes separated by 1.4x eye height; malar space length 0.7x eye length; clypeus striate; head otherwise moderately reticulate. Antennae (Fig. 21) inserted below middle of face; scape just shorter

than eye (12: 11.5), reaching beyond median ocellus; pedicel plus flagellum length 0.9x head width.

Thorax: Length 1.8x width, in profile thoracic dorsum evenly and weakly curved; pronotal collar anteriorly margined, posteriorly with smooth strip. Mesoscutum width 2.3x length, moderately reticulate. Scutellum wider than long (1.3x), slightly convex; frenal area slightly depressed. Propodeum (Fig. 23) medially 0.9x length of scutellum; median area broad, 1.3x as broad as median length, raised reticulate; median carina weak; nucha coarsely reticulate, occupying one third length of propodeum; plicae sharp; post spiracular sulcus with a transverse ridge; spiracles elongate oval; callus moderately hairy. Forewing (Fig. 22) length 2.5x width; basal cell with a few scattered hairs at distal end. Basal vein bare; costal cell with a single row of hairs on upper half, which is complete distally; MV 1.7x STV and as long as PMV. Relative lengths of SMV, MV, PMV and STV as 30 : 12.5 : 12.5 : 7.5.

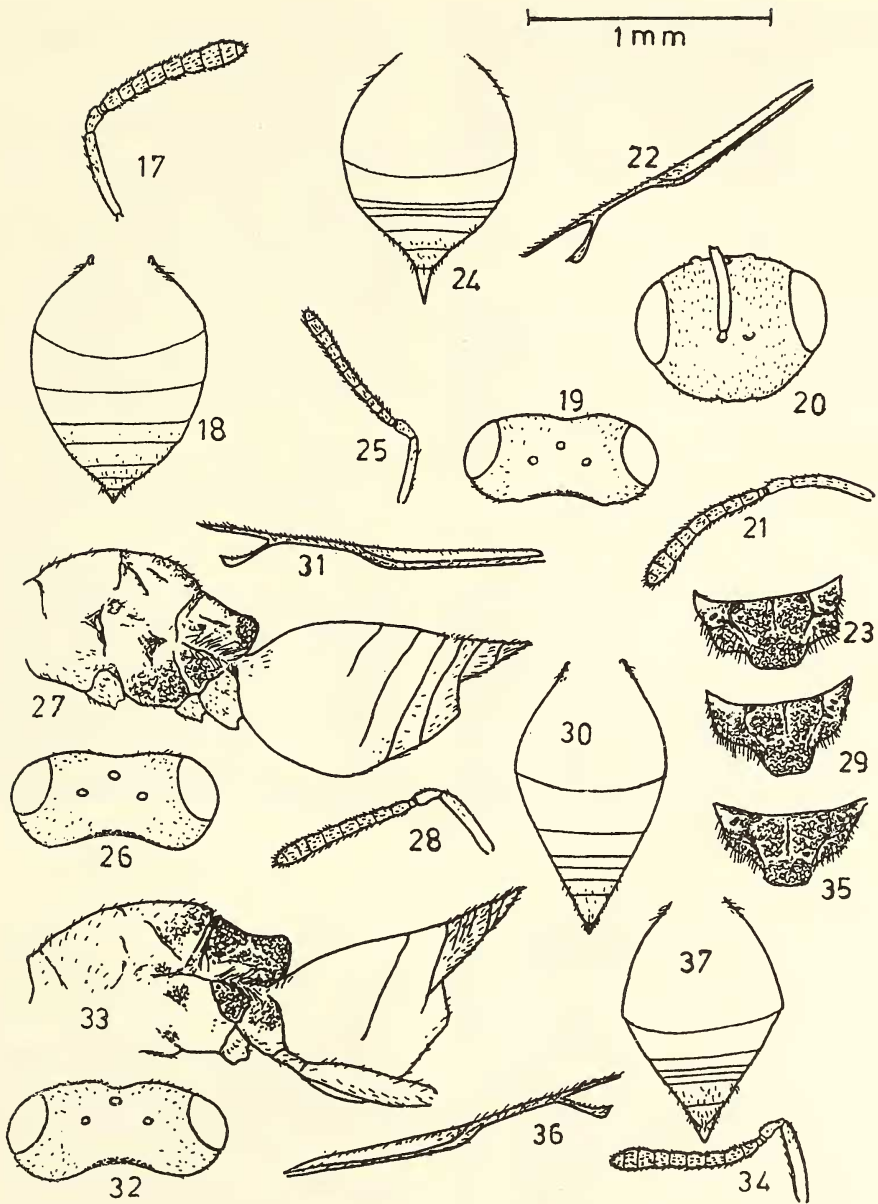
Gaster (Fig. 24): Ovate, length 1.3x width (without ovipositor sheath); ovipositor sheaths strongly protruding.

Male (Fig. 25): Length 1.6 mm. Resembles female, but differs in antennae being slender and gaster shorter.

Material examined: Holotype: Female: India, Kerala, Vayalar, 27.ii.1989, Coll. P.M. Sureshan. **Allotype:** Male, data same as holotype. Paratypes: Kerala: 3 Females, data same as that of holotype; 1 Female, Elamathkavala (Shertallai), 27.ii.1989; 1 Female, Akalam (Trivandrum), 25.ii.1989; 1 Female, Attingal, 23.ii.1989, Coll. P.M. Sureshan.

Remarks: This species closely resembles *T. lasiocampae* (Graham) but differs from it in having pronotal collar regularly margined even at sides; median area of propodeum 1.3x as broad as long; median carina weak; PMV as long as MV, head and thorax bronze green, flagellum

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Figs 17-18: *Trichomalopsis acarinata* sp. nov. Female: 17. Antenna, 18. Gaster in dorsal view;
 Figs 19-25: *Trichomalopsis ovigastra* sp. nov. Female: 19. Head in dorsal view, 20. Head in front view,
 21. Antenna, 22. Forewing venation, 23. Propodeum, 24. Gaster in dorsal view, 25. Male antenna;
 Figs 26-31: *Trichomalopsis travancorensis* sp. nov. Female: 26. Head in dorsal view, 27. Thorax and gaster
 in profile, 28. Antenna, 29. Propodeum, 30. Gaster in dorsal view, 31. Forewing venation;
 Figs 32-37: *Trichomalopsis neelagastra* sp. nov. Female: 32. Head in dorsal view, 33. Thorax and gaster in
 profile, 34. Antenna, 35. Propodeum, 36. Forewing venation, 37. Gaster in dorsal view.

not stout (in *lasiocampae* collar irregularly margined except at sides, median area of propodeum 1.1-1.2x as broad as long and median carina distinct; PMV slightly shorter than MV; flagellum stout and thorax bright bluish-green).

Trichomalopsis travancorensis sp. nov.

(Figs 26-31)

Female: Length 1.6-2.3 mm. (Holotype 2.3 mm). Head and thorax dark green with bronze-like gloss dorsally; gaster brown with slight bluish gloss dorsally on T1; Antennae brown with scape testaceous on two third part. Coxae concolorous with thorax; middle coxae brown; legs otherwise testaceous. Tegulae brown; wings hyaline; veins pale brown.

Head (Fig. 26): Width 1.14x thorax, in dorsal view width 2x length, in front view width 1.2x height; POL 1.4x OOL; temple length 0.7x eye length, slightly acuminate posteriorly; eyes separated by 1.4x their length; malar space length 0.6x eye length; clypeus with anterior margin weakly emarginate. Scape (Fig. 28) 0.9x eye length; pedicel plus flagellum length 0.9x head width; club a little longer than two preceding segments combined.

Thorax (Fig. 27): Length 1.6x width, moderately curved in profile; pronotal collar sharply margined almost throughout with smooth strip posteriorly. Mesoscutum width 2.2x length, moderately reticulate. Scutellum wider than long, less convex; frenal area distinct. Propodeum (Fig. 29) with median area 1.2x as broad as long; median carina weak; plicae not reaching tip of nucha; nucha moderately convex; callus moderately hairy; postspiracular sulcus with transverse ridge. Forewing (Fig. 31) with basal cell and vein bare; MV 1.9x STV and 1.3x PMV. Relative lengths of SMV, MV, PMV, and STV as 30 : 14 : 11 : 7.5.

Gaster (Fig. 27, 30): Ovate elongate; length 1.8x width; longer than thorax; petiole

strongly transverse; T1 making up just less than half length (0.43x).

Male: Unknown.

Material examined: Holotype: India, Kerala, Female, Attingal, 23.ii.1989, Coll. P.M. Sureshan. Paratypes: Kerala: Calicut: 1 Female, Kazhakuttom, 25.ii.1989; 2 Females, Shertallai, 27.ii.1989; 1 Female, Vayalar, 27.ii.1989; 1 Female, data same as holotype; 2 Females, Kappil (Trivandrum), 26.ii.1989; 1 Female, Konni, 27.xi.1988; 1 Female, Aakalam (Trivandrum), 25.ii.1989; 1 Female, Ernakulam, 9.ii.1989; Coll. P.M. Sureshan; 1 Female, R.E.C. Calicut, 28.xi.1985, Coll. T.C. Narendran.

Remarks: This species resembles *T. dubius* (Ashmead) in head shape, nature of antenna and propodeum, but differs in having scutellum moderately convex; propodeum with median carina less sharp; gaster longer than thorax (in *dubius* scutellum flattened, propodeum with distinct sharp median carina and gaster about as long as thorax). Closely resembles *T. neelagastra* sp. nov. (also described) but differs from it in the combination of characters given in the key.

Trichomalopsis neelagastra sp. nov.

(Figs 32-37)

Female: Length 2-2.4 mm. (Holotype 2.3 mm). Head and thorax dark bluish-green with bronze-like gloss; gaster dark bluish-green; T1 with strong metallic blue gloss. Antennae brown with paler scape. Coxae concolorous with thorax, remainder of legs testaceous. Tegulae testaceous; wings hyaline; veins pale brownish-yellow.

Head (Fig. 32): Width 1.2x that of thorax; in dorsal view width 2x length and in front view width 1.3x height; temple 0.7x eye length; POL 1.5x OOL; eyes separated by 1.5x their length; malar space 0.6x eye length; clypeus with anterior margin weakly emarginate; head moderately reticulate. Toruli placed above lower margin of eyes; scape (Fig. 34) as long as eye,

reaching level of vertex; combined length of pedicel and flagellum 0.9x head width.

Thorax (Fig. 33): Length 1.6x width; pronotal collar anteriorly margined throughout. Mesoscutum width 2.2x length. Scutellum less convex, wider than long, similarly sculptured as on mesoscutum; frenal area indicated. Propodeum (Fig. 35) with median area 1.2x as broad as long; median carina weak; plicae moderately strong; nucha convex; post spiracular sulcus with transverse ridge. Forewing (Fig. 36) with MV 1.8x STV and 1.5x PMV. Relative lengths of SMV, MV, PMV and STV as 41 : 15 : 10 : 8.5.

Gaster (Figs 33, 37): Ovate, length 1.7x width; as long as thorax; T1 occupying 0.54x length of gaster.

Male: Unknown.

Material examined: Holotype: India, Kerala, Female: Sreekariyam (Trivandrum), 25.ii.1989, Coll. P.M. Sureshan; Paratypes: Kerala: 1 Female, Kayamkulam, 21.ii.1989; 1 Female, Kappil (Trivandrum), 26.ii.1989; 1 Female, data same as holotype; 1 Female, Chavara, 22.ii.1989; 1 Female, Elamathkavala

(Shertallai), 27.ii.1989; 1 Female, Ernakulam, 9.ii.1989; 1 Female, Tenjipalam (Malappuaram), 16.x.1988, Coll. P.M. Sureshan.

Remarks: This species generally resembles *T. caricicola* (Graham), but differs in having temple 0.7x eye length; mesoscutum width 2.2x length, moderately reticulate; MV about 1.8x STV and 1.5x PMV; T1 occupying 0.54 x length of gaster (in *caricicola* temple about one quarter the length of eye; mesoscutum about twice as broad as long and finely reticulate; MV about 1.5-1.6x STV and PMV subequal to MV and T1 occupying rather less than half length of gaster).

ACKNOWLEDGEMENTS

We are grateful to Dr. K. Kamiyo, Bibai, Hokkaido, Japan for providing type material of the Oriental and Japanese species of *Trichomalopsis* and literature. P.M. Sureshan thanks the Director, Zoological Survey of India, Kolkata and the Officer-in-charge, Zoological Survey of India, Western Ghats Field Research Station, Calicut, Kerala for facilities and encouragement.

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